



**NEW ENGLAND  
COMMON ASSESSMENT PROGRAM**

**Released Items  
2008**

**Grade 11  
Mathematics**

# Mathematics



Items with this symbol were selected from Session One—no calculators or other mathematics tools allowed.



- 1 If  $x^2 < y^2$ , which inequality **must** be true?

- A.  $x < y$
- B.  $x^3 < y^3$
- C.  $|x| < |y|$
- D.  $\frac{1}{x} < \frac{1}{y}$



- 2 Jesse travels 15.0 miles by boat in 2.5 hours. What is his average speed in knots?  
[1 knot  $\approx$  1.2 miles per hour]

- A. 5.0 knots
- B. 6.0 knots
- C. 7.2 knots
- D. 12.5 knots

- 3 Look at this statement.

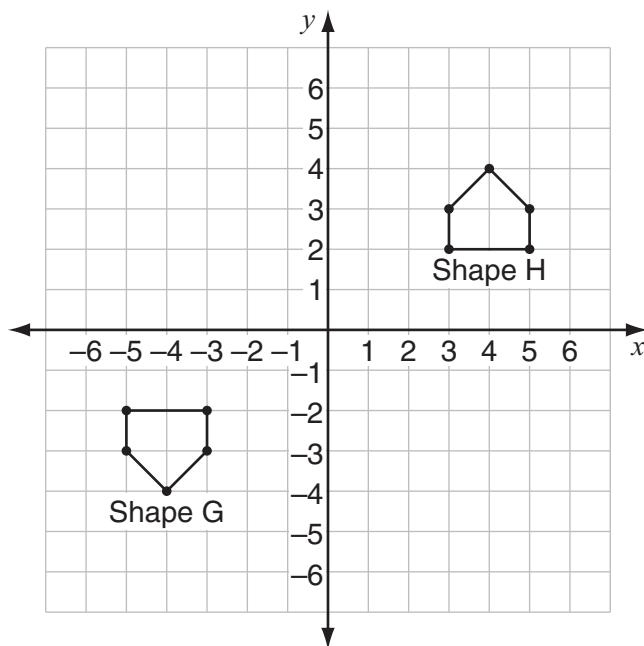
Any transformation of triangle  $LMN$  on a coordinate grid results in a congruent image.

Which transformation represents a **counterexample** to this statement?

- A. Triangle  $LMN$  is reflected about the line  $y = -5$ .
- B. Triangle  $LMN$  is translated 4 units left and 2 units down.
- C. Triangle  $LMN$  is rotated  $90^\circ$  counterclockwise about the point  $(0, 0)$ .
- D. Triangle  $LMN$  is dilated with a scale factor of 2 about the point  $(0, 0)$ .



- 4 Look at Shape G and Shape H on this grid.

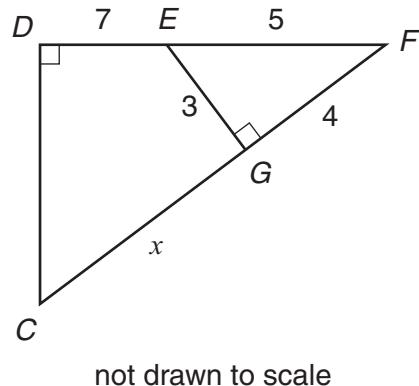


Which transformations will show that Shape G is congruent to Shape H?

- A. Translate Shape G right 8 units and then reflect it across the  $y$ -axis.
- B. Translate Shape G right 6 units and then reflect it across the  $x$ -axis.
- C. Translate Shape G right 8 units and then reflect it across the  $x$ -axis.
- D. Translate Shape G up 6 units and then reflect it across the  $y$ -axis.



- 5 Look at these triangles.



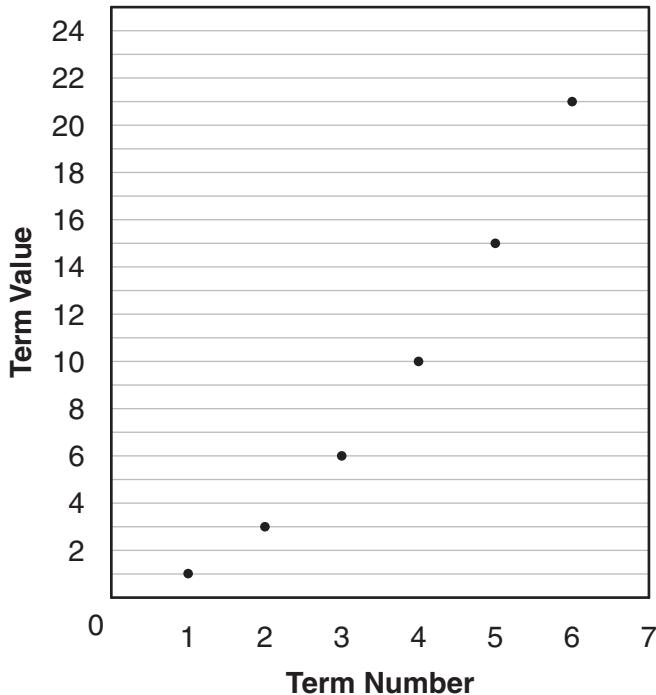
not drawn to scale

Triangle  $CDF$  is similar to triangle  $EGF$  ( $\Delta CDF \sim \Delta EGF$ ). What is the value of  $x$ ?

- A. 15
- B. 11
- C. 9
- D. 6



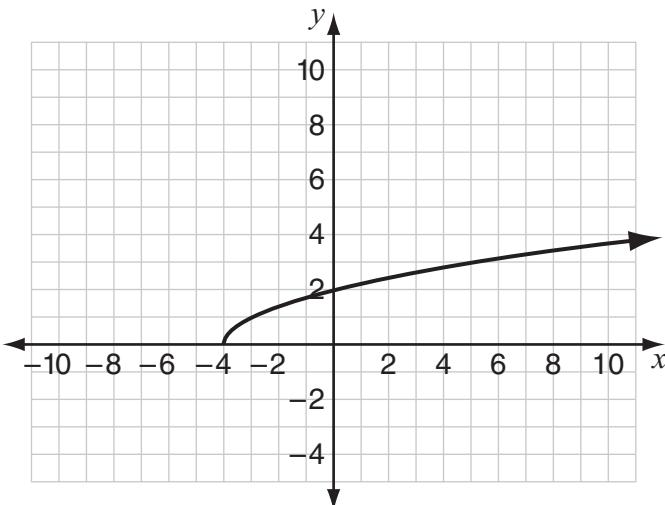
- 6 Look at the pattern shown in this graph.



If the pattern continues, what will be the value of Term 7 of this pattern?

- A. 27
- B. 28
- C. 29
- D. 30

- 7 Look at this graph of a function. ( $y$  is a function of  $x$ .)



What is the domain of the function?

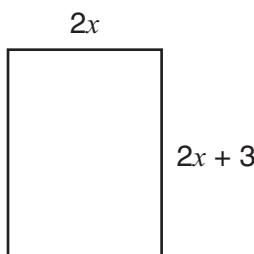
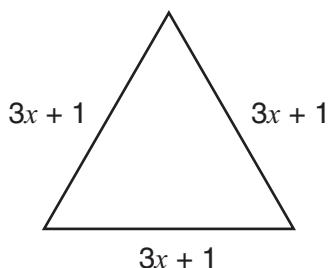
- A. all real numbers
- B. all real numbers except  $-4$
- C. all real numbers greater than or equal to  $0$
- D. all real numbers greater than or equal to  $-4$



- 8 Which expression is equivalent to  $(a + b)^2$ ?

- A.  $a^2 + b^2$
- B.  $2a + 2b$
- C.  $a^2 + ab + b^2$
- D.  $a^2 + 2ab + b^2$

- 9 Look at these two shapes.



The perimeter of the triangle is equal to the perimeter of the rectangle. Which equation **must** be true?

- A.  $3x + 1 = 2x + 2x + 3$
- B.  $3(3x + 1) = 2(2x + 3)$
- C.  $3 \cdot 3x + 1 = 2 \cdot 2x + 3$
- D.  $3(3x + 1) = 2(2x + 2x + 3)$



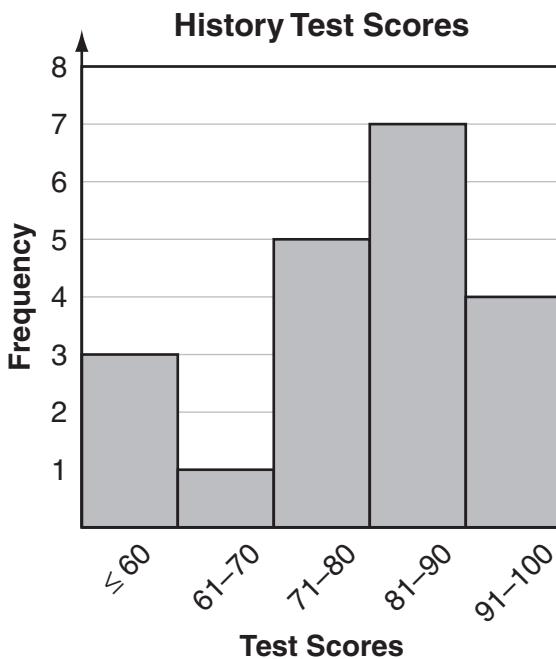
- 10 Adam wants to earn a total of \$300 each week by walking dogs for  $d$  hours and mowing lawns for  $m$  hours. The graph below shows all possible numbers of hours Adam could walk dogs and mow lawns to earn exactly \$300 a week.



Last week Adam walked dogs for the same number of hours that he mowed lawns. He earned \$300. How many **total** hours did Adam walk dogs and mow lawns last week?

- A. 20
- B. 24
- C. 28
- D. 30

- 11 Look at this histogram.



Based on the histogram, which statement **must** be true?

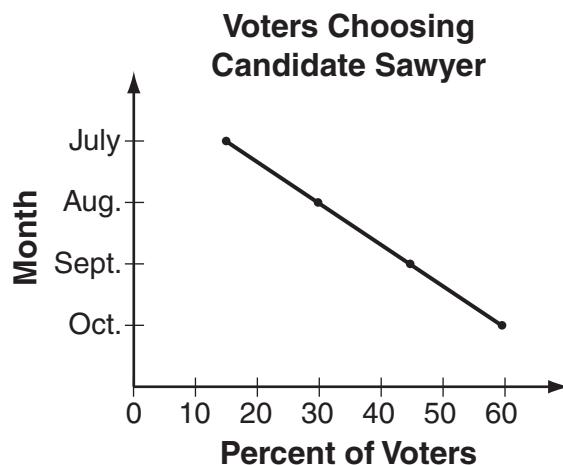
- A. The mode test score is 85.
- B. Exactly four students scored 100.
- C. The median test score is between 81 and 90.
- D. One-fourth of the students scored higher than 90.



- 12 This table shows the results of polls taken during the four months preceding an election between two candidates—Sawyer and Hillman.

Percent of Voters Choosing Sawyer			
July	Aug.	Sept.	Oct.
15%	30%	45%	60%

Hillman published this graph in a newspaper.

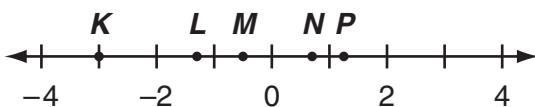


How could this graph be misleading about Sawyer's popularity?

- A. The graph does not show the number of voters polled each month.
- B. The graph does not show the percent of voters who chose Hillman.
- C. The graph gives the impression that Sawyer's popularity is decreasing.
- D. The graph gives the impression that Sawyer's popularity is changing at a constant rate.



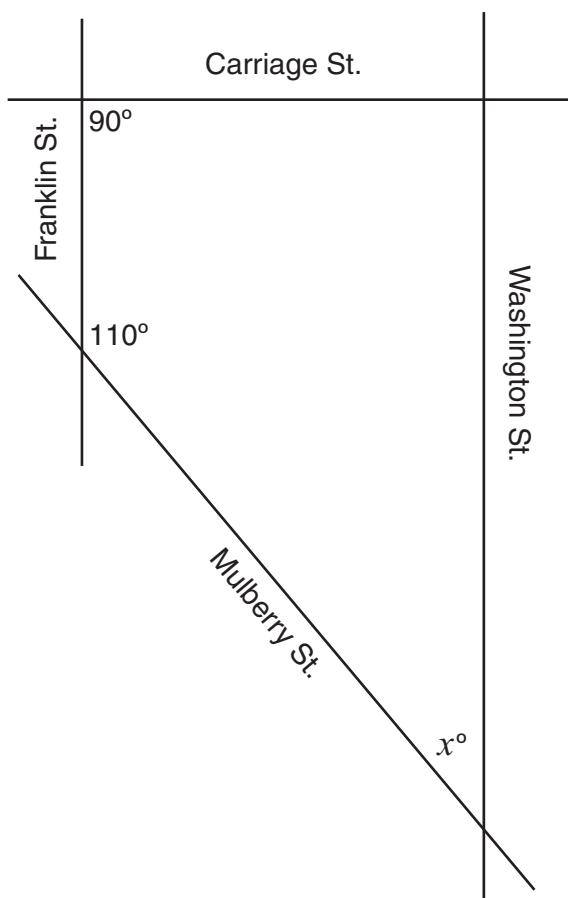
- 13 Look at this number line.



Points  $K$ ,  $L$ ,  $M$ ,  $N$ , and  $P$  are labeled on the number line. Identify all labeled points that are solutions to the inequality below.

$$0 < \frac{1}{x^2} < 1$$

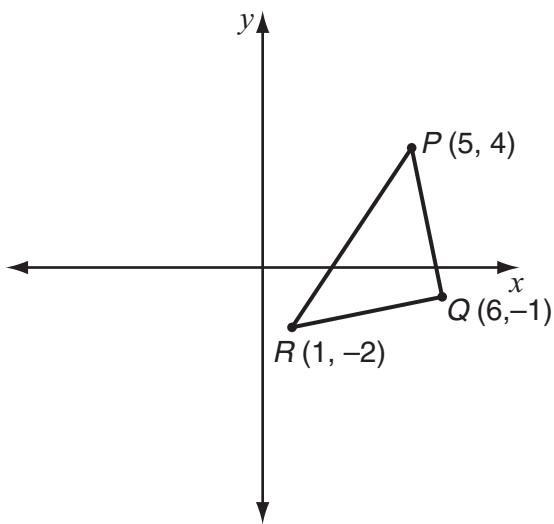
- 14 Look at this diagram.



not drawn to scale

Franklin St. is parallel to Washington St. What is the value of  $x$ ?

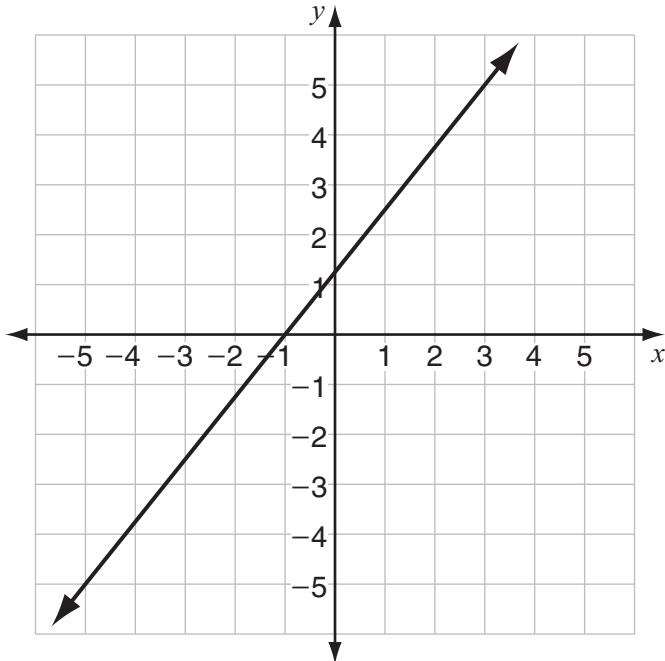
- 15 Look at  $\triangle PQR$ .



What are the coordinates of the midpoint of  $\overline{RP}$ ?



- 16 This graph shows a linear relationship between  $x$  and  $y$ .



Based on the graph, what is the value of  $x$  when the value of  $y$  is 10?



- 17 Look at this equation.

$$y = \sqrt{10 + x}$$

Find one value of  $x$  that makes  $y$  an integer.



- 18 Look at this equation.

$$1 + 3(x - 5) = 7 + x$$

What value of  $x$  will make this equation true?

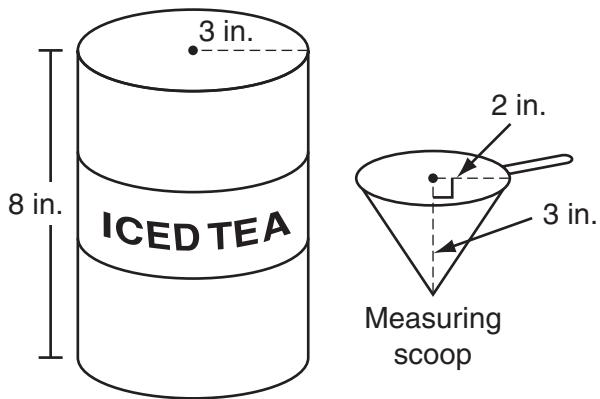


- 19 In these inequalities, both  $P$  and  $Q$  are **integers**.

- $\sqrt{2} < P < \sqrt{5}$
- $P < Q < \sqrt{10}$

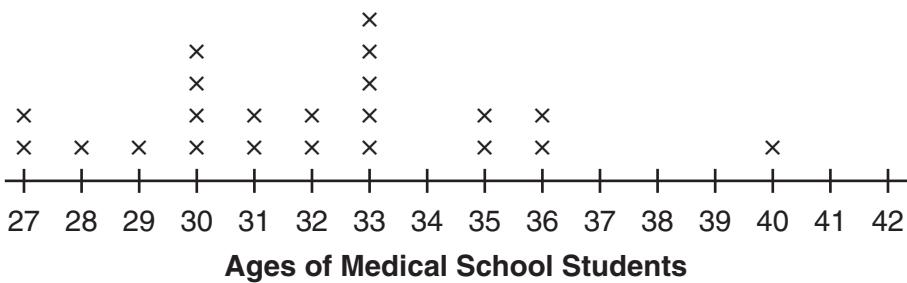
What are all the possible integer values of  $Q$ ? Show your work or explain how you know.

- 20 This diagram shows a cylindrical container of iced tea mix and a cone-shaped measuring scoop.



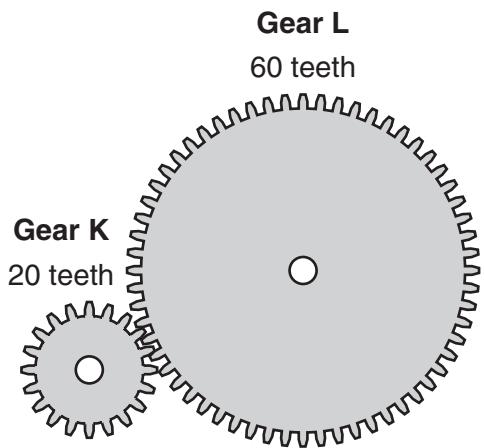
One level measuring scoop of iced tea mix makes one pitcher of iced tea. How many pitchers of iced tea can be made from this full container of iced tea mix? Show your work or explain how you know.

- 21 Look at this line plot.



When three additional students' ages are included in the data, the mode age changes but the median age remains the same. What could be the ages of the three additional students? Be sure to list each of the three ages. Explain your reasoning.

- 22 This diagram shows two gears with interlocking teeth.



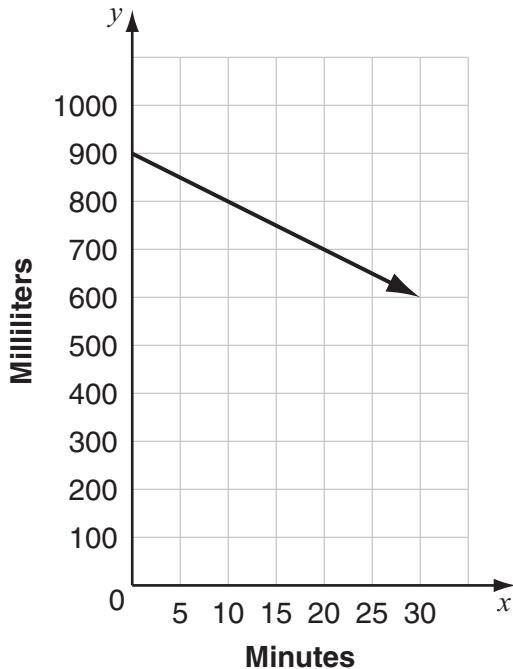
- a. If Gear K makes 120 revolutions, how many revolutions does Gear L make?
- b. If Gear L makes 15 revolutions per minute, how many revolutions does Gear K make in **one hour**? Show your work or explain how you know.

Gear Q and Gear R are two other gears with interlocking teeth.

- Gear Q has 50 teeth.
  - Gear R has 75 teeth.
- c. If Gear Q makes 7200 revolutions per hour, how many revolutions does Gear R make in **one minute**? Show your work or explain how you know.



- 23 A liquid solution is slowly leaking from a container. This graph shows the milliliters of solution,  $y$ , remaining in the container after  $x$  minutes.



- a. What is the  $y$ -intercept of the line?
- b. What is the slope of the line?
- c. What does the slope of the line represent?
- d. Use the graph and your answer from part b to predict the number of minutes it will take for the container to empty if the solution continues leaking at the same rate. Show your work or explain how you know.

## Grade 11 Mathematics Released Item Information

Released Item Number	1	2	3	4	5	6	7	8	9	10	11	12
No Tools Allowed	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Content Strand <sup>1</sup>	NO	NO	GM	GM	GM	FA	FA	FA	FA	FA	DP	DP
GSE Code	10-2	10-4	10-2	10-4	10-5	10-1	10-2	10-3	10-4	10-4	10-1	10-3
Depth of Knowledge Code	2	2	1	1	2	2	1	1	1	2	2	2
Item Type <sup>2</sup>	MC											
Answer Key	C	A	D	C	B	B	D	D	D	B	C	C
Total Possible Points	1	1	1	1	1	1	1	1	1	1	1	1

Released Item Number	13	14	15	16	17	18	19	20	21	22	23
No Tools Allowed	✓		✓	✓	✓	✓	✓				✓
Content Strand <sup>1</sup>	NO	GM	GM	FA	FA	NO	GM	DP	GM	FA	FA
GSE Code	10-2	10-9	10-1	10-3	10-4	10-2	10-6	10-2	10-7	10-2	10-2
Depth of Knowledge Code	2	1	1	2	2	1	3	2	3	2	2
Item Type <sup>2</sup>	SA	CR	CR	CR							
Answer Key											
Total Possible Points	1	1	1	1	1	1	2	2	2	4	4

<sup>1</sup>Content Strand: NO = Numbers & Operations, GM = Geometry & Measurement, FA = Functions & Algebra,  
DP = Data, Statistics, & Probability

<sup>2</sup>Item Type: MC = Multiple Choice, SA = Short Answer, CR = Constructed Response